BMHP6027_BIRM: Empowering the Older Person Week 8- Critical Evaluation of Technological Solutions- Dementia

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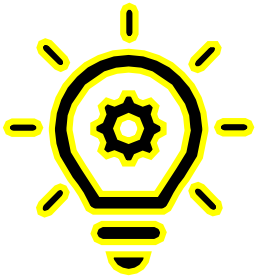
Learning Objectives for this Session

- Evaluate the benefits and limitations of technological solutions in elderly care.
- Discuss ethical concerns, including autonomy, privacy, and dignity.
- Engage in debates regarding the ethical use of technology in the care of older adults.

Recap from Last Session



- What are some key types of technologies used in elderly care?
- How does telemedicine benefit elderly patients, especially those in rural or remote areas?
- What are some challenges older adults may face when using assistive technologies like wearable devices or smart home systems?
- Can you name an example of an AI-driven solution in elderly care? What role does it play?
- What are some of the ethical considerations we discussed regarding the use of technology in elderly care?

Key Benefits of Technological Solutions in Elderly Care

Increased Independence for Older Adults

- Technologies such as wearable health devices, fall detection systems, and smart home technologies enable older adults to live more independently.

Examples

- Wearables like **Fitbit** or **Apple Watch** track heart rate, steps, and sleep patterns.
- Smart home systems such as Amazon **Alexa** remind users to take medication, lock doors, or adjust the thermostat without assistance.

The **benefit** is that these technologies reduce the need for constant caregiver oversight, giving older adults more autonomy while ensuring safety.

Key Benefits of Technological Solutions in Elderly Care

Enhanced Safety and Monitoring

- Continuous monitoring systems improve safety by detecting falls or abnormal health patterns and alerting caregivers or emergency services.

Examples

- **Fall detection sensors** integrated into wearables like Life Alert can automatically contact emergency services if the wearer falls.
- **Remote health monitoring** tools allow healthcare providers to keep track of patients' vitals from a distance, reducing the need for frequent in-person visits.

The **benefit** is that these systems ensure timely intervention in emergencies, potentially saving lives and reducing hospitalisation rates.

Key Benefits of Technological Solutions in Elderly Care

Improved Access to Healthcare via Telemedicine

- Telemedicine expands access to healthcare services for older adults, especially those living in rural or remote areas with limited healthcare facilities.

Examples

- **Video consultations** with doctors through platforms like **Zoom** or Microsoft **Teams** allow patients to receive medical advice from the comfort of their home.
- **Remote diagnostic tools** help doctors monitor patient vitals and send prescriptions without the need for a physical visit.

The **benefit** is that this reduces the burden of travel, which is particularly useful for elderly individuals who may have mobility issues, while providing timely medical intervention.

Key Benefits of Technological Solutions in Elderly Care

Cost Efficiency

- Many technological solutions reduce the overall cost of care by decreasing hospital readmissions, reducing the need for in-home caregivers, and facilitating preventative care.

Examples

- Telemedicine consultations are often less expensive than in-person visits.
- Preventative health monitoring through wearable devices helps detect health issues early, avoiding costly emergency treatments.

The **benefit** is that Technology provides a cost-effective way for elderly care facilities and families to ensure the well-being of older adults without sacrificing quality.

Key Benefits of Technological Solutions in Elderly Care

Social Connectivity and Emotional Support

- Companion robots and social apps combat loneliness and isolation, which are common issues among older adults.

Examples

- Robots like Paro (a therapeutic robot designed to comfort older adults) and Pepper (a humanoid robot) engage with patients to alleviate loneliness.
- Social platforms like Facebook or WhatsApp allow elderly individuals to maintain contact with family and friends, reducing feelings of isolation.

The **benefit** is that these technologies enhance mental well-being by providing older adults with companionship and maintaining their social networks.

Key Benefits of Technological Solutions in Elderly Care

Improved Quality of Life

- Technology not only supports the physical health of older adults but also improves their overall quality of life by addressing mental and emotional needs.

Examples

- Digital platforms for cognitive training (e.g., brain games) help maintain cognitive function in older adults.
- Music therapy apps and platforms that stream personalized content bring joy and emotional stimulation.

The **benefit** is that by improving mental and emotional health, these technologies contribute to a more holistic approach to elderly care.

Limitations of Technological Solutions

Key Limitations

- Digital literacy barriers for older adults.
- Over-reliance on technology can reduce human interaction.
- High costs of advanced technologies (e.g., companion robots, wearable devices).

How do we ensure older adults are not excluded from care because of technology?

Digital Inclusion in Older People

Please look at the Age UK Briefing

- Facts and figures about digital inclusion and older people

(you can access this below or through Moodle)

https-//www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/active-communities/internet-use-statistics-june-2024.pdf

What does this tell you about digital inclusion/exclusion in the older population?

Digital Exclusion in Older People

65-70 Year Olds

- 16.3% of people with disabilities have **never** used the internet
- 8.7% of people without disabilities have **never** used the internet

Over **75's**

- 44.6% of people with disabilities have never used the internet
- 32.2% of people without disabilities have never used the internet

(ONS, 2021)

Limitations of Technological Solutions

- Digital literacy barriers and accessibility for older adults.
- High costs of advanced technologies (e.g., companion robots, wearable devices).
- Over-reliance on technology can reduce human interaction.
- Privacy and security concerns.
- Technological Failures and Reliability Issues.
- Ethical Concerns- Autonomy vs. Safety

How do we ensure older adults are not excluded from care because of technology?

Limitations- Digital Literacy and Accessibility

- Many older adults face challenges when it comes to using new technologies due to a lack of digital literacy. While younger generations may be comfortable with smartphones, tablets, and digital health tools, a significant portion of the elderly population has little to no experience using these devices.
- This digital divide means that the elderly, especially those in rural or low-income areas, may struggle to fully benefit from technological solutions.
- **Possible Solutions-** Digital literacy training programs for older adults, simplified user interfaces, and devices designed with elderly users in mind.

Case Study 1 – Telemedicine in Rural Areas

Class Activity- Group Discussion

- We will all read Barbra's Case Study on Moodle and answer the questions provided together.

Limitations- High Costs and Affordability

- Many advanced technological solutions, such as AI-driven diagnostic tools, robotic companions, and smart home systems, come with high upfront costs, making them inaccessible to a significant portion of the elderly population.
- Robotic companions like Paro (a therapeutic robot) and Pepper can cost thousands of pounds, while installing smart home systems with sensors and voice-activated assistants can also require substantial financial investment.
- Impact- Low-income elderly individuals, especially those without financial support from family or government schemes, may be unable to afford these technologies, creating inequalities in access to care.
- **Possible Solutions-** Subsidies, government grants, and public-private partnerships could help reduce the cost burden, ensuring that these technologies are accessible to more people.

Limitations- Over-reliance on Technology and Reduced Human Interaction

While technology can support care, there is a growing concern that it could lead to an over-reliance on machines, diminishing the role of human interaction in elderly care.

- Companion robots can provide emotional support, but they lack the ability to truly understand and empathise with an elderly person in the way a human caregiver can.
- Telemedicine may provide convenience, but it cannot replace the reassurance and rapport built during in-person doctor visits.
- Elderly individuals who already feel isolated may experience greater emotional and social disconnection if they rely too heavily on technology for their care.

Possible Solutions- Care strategies should balance the use of technology with human-centred approaches. Encourageing frequent in-person visits, caregiver check-ins, and creating community support networks can ensure that technology supplements, rather than replaces, human care.

Limitations- Privacy and Security Concerns

The collection, storage, and transmission of sensitive health data could make elderly patients vulnerable to data breaches, hacking, or misuse of personal information.

- There have been a number of reports of major healthcare data breaches in the UK which compromised the medical records of over 1 million patients, including elderly individuals. Personal health information was exposed, raising concerns about the security of telemedicine platforms and health monitoring systems.
- Older adults may be particularly vulnerable to identity theft and fraud if their health data is accessed by unauthorised individuals. Moreover, the fear of compromised privacy may discourage some elderly individuals from adopting digital health tools.

Possible Solutions- Stronger data protection measures, stricter regulations, and clearer consent policies are needed to safeguard elderly patients' health data. Healthcare providers must ensure that the digital platforms they use meet the highest security standards.

Limitations- Technological Failures and Reliability Issues

Internet connectivity and stable power sources may not always be reliable, particularly in rural or underdeveloped areas. Also, technologies can malfunction, leaving elderly users without access to critical care or support when they need it most.

- In areas with poor internet connectivity, telemedicine consultations can be disrupted, or remote health monitoring devices may fail to transmit vital data to healthcare providers.
- Technological failures can have serious consequences, especially for elderly individuals who rely on these tools for monitoring chronic conditions. In emergencies, a malfunctioning fall detection system or a glitchy telemedicine consultation can delay medical assistance.

Possible Solutions- Backup systems and fail-safes should be integrated into care technologies to ensure that they remain operational during outages or system failures. Additionally, regular maintenance and technical support should be made readily available to elderly users.

Limitations- Ethical Concerns- Autonomy vs. Safety

Technologies like GPS tracking and remote monitoring can ensure the safety of elderly individuals, especially those with cognitive impairments, but they also raise ethical concerns around autonomy and privacy.

- In the case of dementia patients, GPS tracking can prevent wandering and potential harm, but it may also infringe on the individual's sense of autonomy and freedom.
- Families and caregivers often face difficult decisions about whether to prioritize safety over autonomy, particularly when using monitoring technologies. Elderly individuals may feel that their independence is being compromised, which could lead to feelings of resentment or a loss of dignity.

Possible Solutions- Ethical frameworks must guide the use of these technologies, ensuring that the elderly have a say in their own care and that technology is implemented in a way that respects their autonomy while ensuring their safety.

Understanding Dementia and Its Impact on Care Needs

What is Dementia?

What do you think?

Think about this and come up with some definitions

Feedback…

Understanding Dementia and Its Impact on Care Needs

What is Dementia?

- Dementia is a syndrome in which there is deterioration in cognitive function beyond what might be expected from the usual consequences of biological ageing. (WHO, 2022)

- Dementia is a syndrome (a group of related symptoms) associated with an ongoing decline of brain functioning. (NHS, 2020)

Dementia

- There are more than 100 types or causes of dementia
- Alzheimer's Disease makes up 60-70% of all dementias
- Dementia is a terminal, progressive chronic illness
- There is no cure, although there is some treatment for certain types
- The medical model of care not appropriate for early-stage dementia

(WHO, 2022; Alzheimer's Disease International, 2018)

Dementia Causes Changes in…

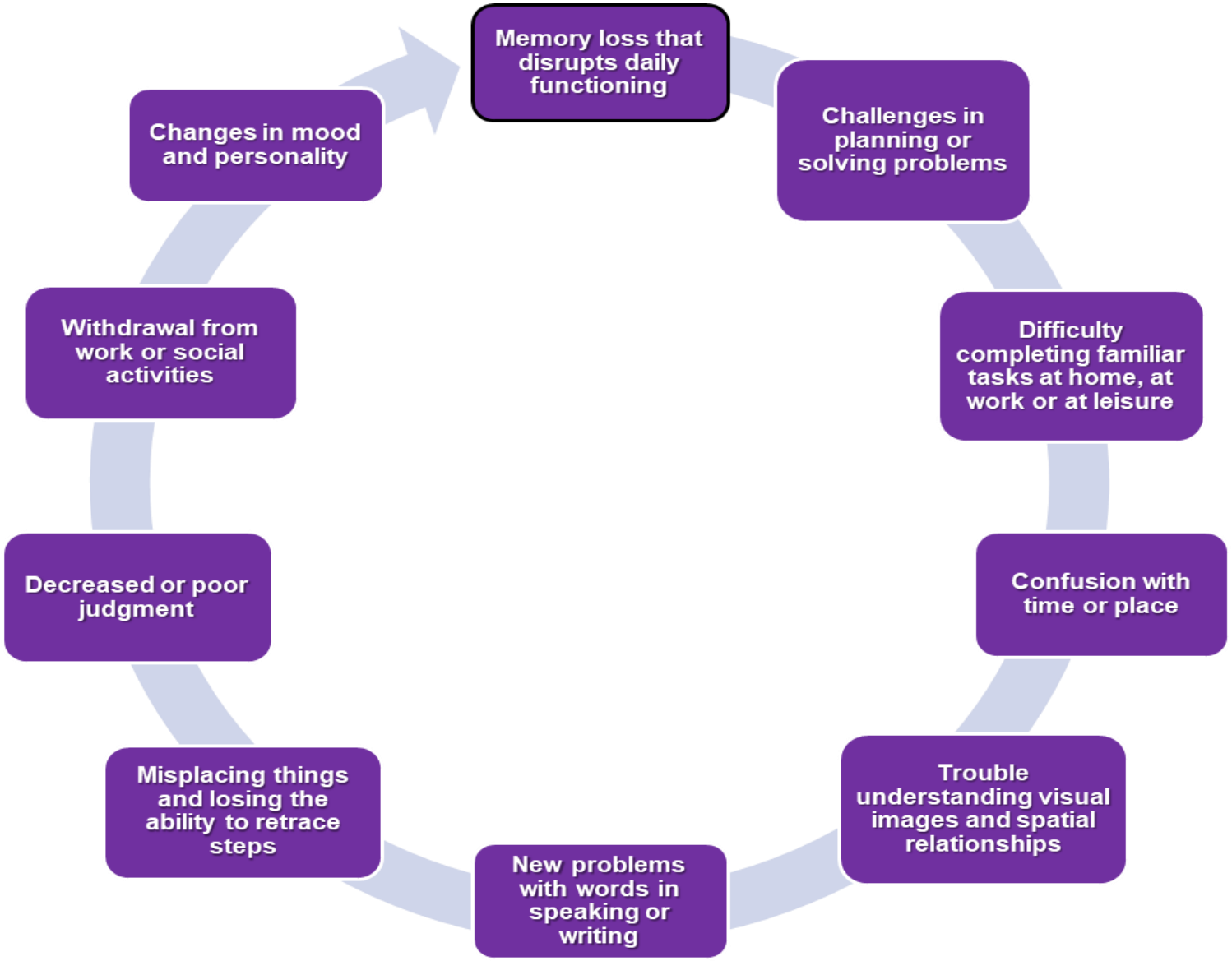
- Memory
- Language
- Thought
- Physical health
- Navigation
- Mobility
- Behaviour
- Personality / Mood

(Brooker and Lillyman, 2013)

Types of Dementia

- Alzheimer's Disease (the most common around 60%)
- Vascular Dementia (caused by reduced blood flow to the brain. It's estimated to affect around 150,000 people in the UK)
- Fronto-temporal Dementia (Begins earlier and progresses faster than Alzheimer's)
- Dementia due to Parkinson's / Lewy Bodies (20-40% also have dementia)
- Alcohol-induced Persisting Dementia (this can be partially reversed through abstinence and high doses of thiamine)
- Mixed Dementias (Alzheimer's Disease and another type of dementia can exist at the same time)

Ten Dementia WARNING SIGNS



Diagnosing Dementia

Initial Screening-Medical History-

Gathering details about symptoms, medical background, and family history.

Physical and Neurological Exams- Testing for reflexes, coordination, and physical signs that may signal other health issues.

Cognitive Assessments-

Mini-Mental State Examination (MMSE)- Measures memory, attention, language, and other cognitive functions.

Montreal Cognitive Assessment (MoCA)- Screens for mild cognitive impairment and dementia.

Brain Imageing-MRI and CT Scans- Detect brain abnormalities, strokes, or tumors that may contribute to dementia symptoms.

PET Scans- Identifies amyloid plaques or tau tangles in the brain, markers associated with Alzheimer's disease.

Blood and Lab Tests- Rules out conditions like vitamin deficiencies, infections, or hormonal imbalances that can mimic dementia.

Challenges in Diagnosing Dementia

Normal Ageing vs. Dementia- Mild forgetfulness and slower information processing are common in ageing but do not severely impact daily life.

Signs Overlooked as ageing- Symptoms like repetitive questioning or getting lost in familiar places are often mistaken for normal ageing, delaying diagnosis.

Critical Point- Older adults may not report symptoms or may attribute them to “just getting older,” complicating early identification.

Challenges in Diagnosing Dementia

Sensory Impairments-

- Hearing Loss- Miscommunication due to hearing impairment can be mistaken for cognitive decline; hearing issues often worsen isolation and confusion.
- Vision Loss- Visual impairment may cause misinterpretations of surroundings, disorientation, or increased dependence on others, masking cognitive symptoms.

Standard cognitive tests rely on clear auditory and visual input, so sensory impairments can lead to inaccurate results.

Comorbidities and Medication Effects- Other Health Conditions- Conditions like depression, anxiety, or medication side effects can produce dementia-like symptoms.

Medication- Polypharmacy (use of multiple medications) in older adults can cause confusion, dizziness, or memory issues, complicating diagnosis.

Treatment for Dementia

- There is currently no cure but certain medical treatments and lifestyle interventions can help manage symptoms and slow disease progression, particularly in early stages.
- Treatment approaches vary based on the type of dementia, with Alzheimer's disease being the most common focus of treatment options.

Treatment for Dementia

Medications for Behavioural and Psychological Symptoms-

Antidepressants and Anti-anxiety Medications- Can help manage mood swings, depression, and anxiety, which are common in dementia.

Antipsychotics- Sometimes used to address severe agitation, hallucinations, or aggression, though they carry risks and are generally used cautiously.

Emerging Therapies-Amyloid and Tau-Targeting Drugs- Recent drug developments, such as aducanumab for Alzheimer's, target amyloid plaques in the brain.

These are currently under research and review and have shown mixed but promising results in slowing disease progression.

Clinical Trials- Many experimental treatments are being tested, including those targeting inflammation and other underlying processes in the brain.

Treatment for Dementia

Medications for Cognitive Symptoms-

Cholinesterase Inhibitors- Drugs like donepezil, rivastigmine, and galantamine increase levels of acetylcholine, a chemical that supports memory and learning, and are commonly prescribed for mild to moderate Alzheimer's disease.

Memantine- This medication regulates glutamate, a chemical involved in learning and memory, and is often used in moderate to severe cases of Alzheimer's.

Limitations- These drugs do not stop the progression of dementia but may help improve cognitive function and slow symptom worsening.

Treatment for Dementia

Non-Pharmacological Interventions

Non-drug approaches are also essential in manageing dementia symptoms and improving quality of life, including-

Cognitive Stimulation Therapy- Engageing in memory exercises and social activities can help improve mental functioning.

Occupational Therapy- Supports daily functioning by helping individuals adapt to memory loss and cognitive challenges.

Lifestyle Adjustments- A healthy diet, regular physical exercise, and social engagement may slow cognitive decline and improve overall well-being

However…

Changes in the knowledge and attitude of the population of the UK may be the most effective **treatment** for dementia.

What do you think?

The Use of GPS Tracking in Dementia Care

What is GPS Tracking?

- **GPS** (Global Positioning System) tracking is a technology used to monitor the real-time location of an individual or object.
- For dementia patients, **wearable devices** (e.g., watches, bracelets) equipped with GPS allow caregivers to track their movements

The Use of GPS Tracking in Dementia Care

GPS Tracking – Purpose in Dementia Care

Safety- GPS tracking is used primarily to ensure the safety of people with dementia who may wander and become lost, a common behaviour associated with dementia as it becomes more advanced.

Real-time Alerts- Caregivers can set "safe zones" and receive alerts if the person leaves the designated area.

The Use of GPS Tracking in Dementia Care

Benefits-

Improved Safety- Enables quick intervention if a patient is at risk, reducing incidents of wandering and the danger of injury or getting lost.

Peace of Mind for Families- Families and caregivers are reassured knowing they can monitor the patient's movements remotely.

Increased Independence- Allows people with dementia more freedom to move within monitored areas rather than being physically restricted.

The Use of GPS Tracking in Dementia Care

Ethical Concerns

Autonomy vs. Safety- Is it ethical to track someone without their explicit consent? Does the technology infringe on the patient's freedom?

Privacy- Continuous monitoring raises concerns about the right to privacy for patients who may not fully understand the technology.

Informed Consent- Can dementia patients truly give consent to be tracked, or should the decision be made by caregivers and family members?

Activity 2 –Ethical Considerations of GPS Tracking for People with Dementia

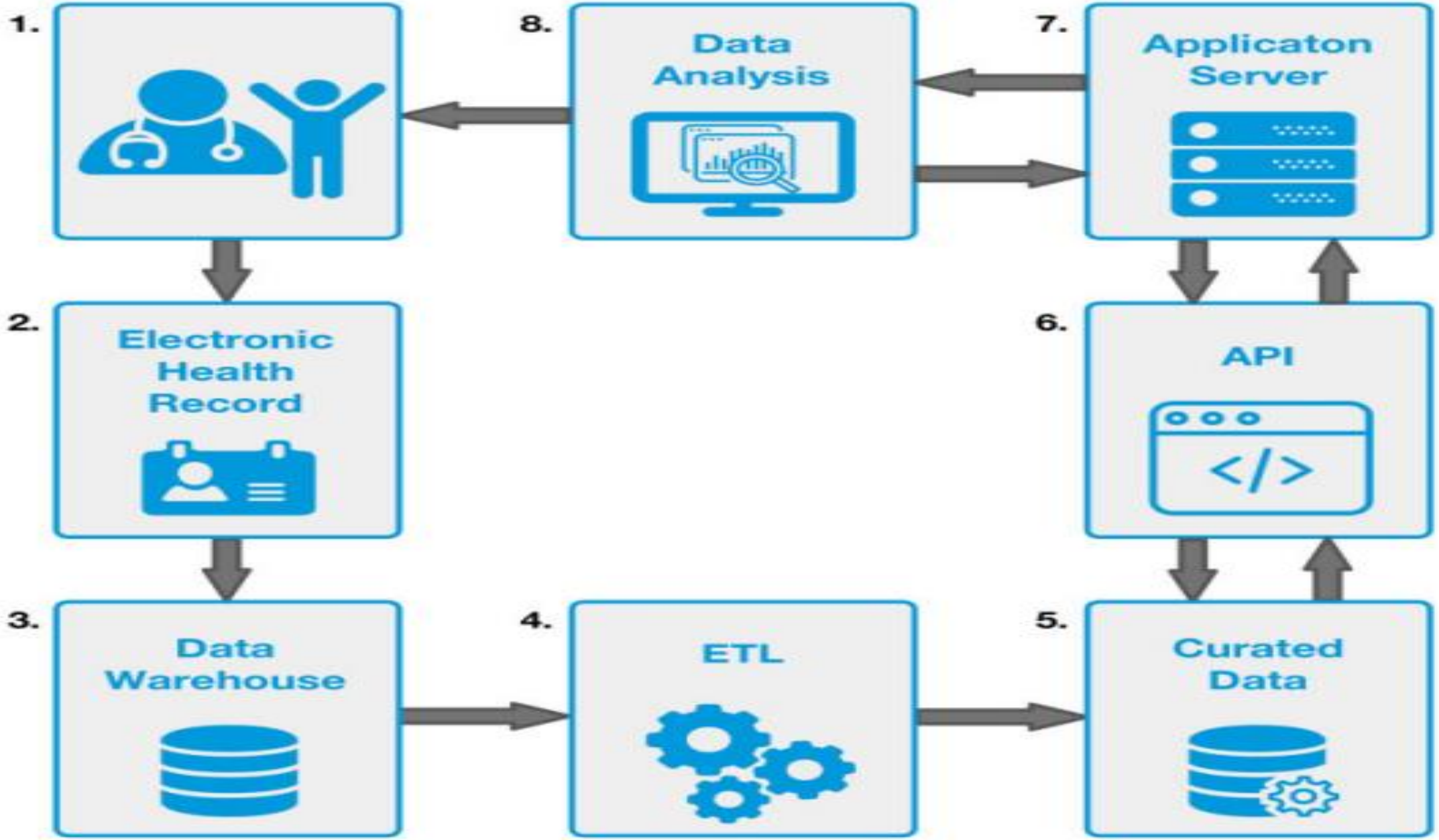
Around 40,000 people with dementia go missing annually in the UK, which can be very stressful for families.

The main reason for this is because dementia causes short-term memory loss. This leads to people getting lost and confused while they are walking, meaning they are unable to find their way home. Those who are not found within 24 hours are more likely to be at risk of serious injury or death (JDR, 2024).

Group Activity-

Please read the case study **Alice's Experience with GPS Tracking** on the Moodle page and follow the instructions given.

The Flow of Health Data from Devices to Healthcare Providers.



The Flow of Health Data from Devices to Healthcare Providers.

1. Clinician and Patient Encounters- Clinicians document patient interactions during care encounters, recording observations and treatments.

2. Data Captured in EHR Systems- Patient data from encounters are collected and stored within Electronic Health Records (EHRs). This includes structured data like vital signs, medications, and medical history.

3. Data Processed into Data Warehouse- The EHR data are then processed overnight, meaning the system takes the data and transfers it into a larger storage facility, known as the EPIC Clarity Data Warehouse.

4. Automated Extraction, Transformation, and Loading (ETL)In this step, data from the warehouse are further processed through an ETL system (Extraction, Transformation, Loading), which ensures the data is ready for analysis by cleaning, formatting, and integrating it.

The Flow of Health Data from Devices to Healthcare Providers.

5. Data Stored in PostgreSQL Database- The processed data is stored in a PostgreSQL database, a structured database optimized for fast querying, auditing, and generating reports.

6. API and Data Request Handling- Requests for this data are handled by an API (Application Programming Interface) built using Python. It interacts with the PostgreSQL database and prepares the data in a format suitable for web applications.

7. Data Access Through Web Applications- Health providers and other users can access this data through a LAMP (Linux, Apache, MySQL, PHP/Perl/Python) stack, which is a suite of software used to run and deliver applications.

8. Data Visualization- Finally, the system presents the data in an easy-to-understand format using Google Charts or DataTables, which allow healthcare professionals to visualize the data, such as through graphs, dashboards, and reports.

Reference List

- Alzheimer's Disease International (2023) *World Alzheimer Report 2023* Available at- https-//www.alzint.org/resource/world-alzheimer-report-2023/ (Accessed 31 May 2024).
- JDR (2024) *Study explores views on new technology to locate missing people with dementia* Available at- https-//news.joindementiaresearch.nihr.ac.uk/study-explores-value-new-technology-locate-missing-people-dementia/ (Accessed- 5 October 2024).
- NHS (2020) *About Dementia* Available at- https-//www.nhs.uk/conditions/dementia/about/#-~-text=What%20is%20dementia,between%20Alzheimer's%20disease%20and%20dementia. (Accessed- 7 October 2024).
- ONS (2021) *Dataset- Internet Users* Available at- https-//www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/internetusers/2020 (Accessed- 4 October 2024).
- WHO (2022) *Dementia* Available at- https-//www.who.int/news-room/fact-sheets/detail/dementia (Accessed- 28 September 2024).